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Government planning in a small oil economy: factors limiting the industrial diversification efforts of Qatar

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The oil reserves of Qatar are small compared to those of some of its neighbouring States in the Persian Gulf. The country has estimated crude oil reserves of 3,200 million barrels, or less than 1 per cent of the world total. This is equivalent to about 30 years of output at current levels, and represents a fraction of reserves in the Persian Gulf region. On the other hand, the country does have significant gas reserves, estimated at 4,400 million cubic metres, or more than 4 per cent of the world total. Only the United Arab Emirates, the former Union of Soviet Socialist Republics (USSR), the Islamic Republic of Iran and Abu Dhabi have larger gas reserves [1].

Because of its limited natural wealth, Qatar was the first of the Arab States in the Persian Gulf region to commit itself firmly to industrial diversification. To this end, in 1972 the Government of Qatar commissioned a detailed study of the country's development opportunities. The result was the creation in 1973 of a national plan providing development guidelines for the next two decades.

The plan emphasized the need for acceleration in housing and paid special attention to the development of the capital city of Doha. It also encouraged the development of light and heavy industries and expansion of the fishing industry. The plan concentrated on infrastructure and diversification of the economy.

The purpose of this paper is to assess industrialization efforts of Qatar to date. In doing so, questions such as the following will be raised: has the country made significant progress towards industrial diversification and in what sense; how has the industrial performance of Qatar compared with that of neighbouring Arab economies in the Persian Gulf region; what particular problems will hinder industrial diversification; and what are the prospects for the future?

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A. Recent economic trends

Crude oil accounted for just under 30 per cent of the gross domestic product (GDP) of Qatar in 1987. Between 1983 and 1987, it accounted for 91-94 per cent of export earnings. Since 1981, Qatar has, with the other States of the Organization of Petroleum Exporting Countries (OPEC), suffered from the impact of the world oil glut. Between 1983 and 1987, the oil sector declined by 15 per cent, with the non-oil sectors increasing by only 0.3 per cent of the period as a whole.

The manufacturing sector in Qatar accounted for 5 per cent of total GDP and 11 per cent of non-oil GDP 1980. There was a steady increase in manufacturing output in the 1980s. By 1987, manufacturing thus accounted for 9.9 per cent of total GDP, or 14.3 per cent of non-oil GDP. It is noteworthy that this increase in the share of manufacturing in GDP is overstated as a result of the decline of the oil sector. While the increase in the share of manufacturing in non-oil GDP is more suggestive of the success achieved by the country in industrial diversification, even here an inflated figure is obtained because of various subsidies, including low utility rates and low rents received by industry.

B. Industrial efficiency

One aim of industrial planning has been to encourage the establishment of industries that use the output of the heavy industries of Qatar as intermediate products. Industries producing tiles, precast concrete items, fine lime and plastic products fit this category rather well. Still, the combined demand for cement, steel bars, lime, and polyethylene is only a fraction of the total output of the industries concerned.

As might be expected, these four heavy manufacturing industries accounted for the bulk of the gross value of output and value added. Thus, the gross value of output in the chemical and plastic products, non-metallic mineral products, and basic metal industries amounted to 1,905.8 million Qatari riyals (QR)* in 1983. That was nearly 72 per cent of the total gross value of output in manufacturing industry. The combined value added in these three industry categories also amounted to just under 78 per cent of total value added in the manufacturing sector in 1983.

In terms of value added, UNIDO [2] data provide another picture of the dual economy of Qatar, as described below:

*Based on the following exchange rate between the United States dollar ($) and the Qatari riyal: US$ = QR 3.65.

(a) The share of value added in gross output is highest in the manufacture of fabricated metal products (106.7 per cent), followed by jewellery (87.6 per cent), and fertilizers and pesticides (84.7 per cent);

(b) The high share of value added in the gross output of most of the heavy industries partly reflects the technical progress that has been injected into the productive process in this sector;

(c) The somewhat low share of value added in the gross output (23.3 per cent) of the manufacture of food, beverages, and tobacco is a reflection of the high cost of imported raw materials and services in this sector. The country is almost totally dependent on imports for manufactured food items.

The Central Statistical Organization, in its industrial survey of 1983 [3], attempted to measure productivity levels in manufacturing industries. That survey produced several interesting patterns:

(a) In 1983, 15,558 persons worked in manufacturing industries, of which 4,058 worked in non-metallic mineral products and 2,557 in chemical and petroleum industries;

(b) Value added per employee was the highest in petroleum refineries (QR 480,000), followed by industrial chemicals other than fertilizers (QR 360,000), and fertilizers and pesticides (QR 316,000);

(c) Labour productivity was lowest in the manufacture of soap, cleaning preparations and perfumes (QR 10,000);

(d) Many industries - slaughtering, preparing and preserving meat, and grain mill products - operate under economies of scale and thus have relatively high working costs.

As Whittingham [4] has noted, a key problem for Qatar is that a handful of small export-oriented factories, of the kind found in any oil-producing country, will never be competitive with those of larger production facilities. Also, the domestic market of Qatar has a minimal need for heavy industrial products. This is another aspect of the country's dualistic industrial structure. The extent to which problems exist is clearly an empirical question. Yet it is one that should be addressed before any conclusions can be drawn about the future development of the manufacturing sector.

C. Comparative analysis

In an effort to compare the development pattern of Qatar with that of other Arab countries, especially neighbouring oil economies, a factor analysis was performed. Factor analysis was chosen as the appropriate technique since it can identify a relatively small number of elements

representing relationships among sets of many interrelated variables. For example, concepts such as sectoral diversification may be expressed as a linear combination of factors that represent different aspects of this phenomenon. In the analysis below, these measures include the sectoral share in non-oil GDP and absorption (total expenditures). Each measure represents a different aspect of diversification. Combined into a single dimension, they provide a more complete measure of diversification than does any single measure alone [5].

D. Methodology

Factor analyses is also appropriate for dealing with the problem at hand since it can compute a relative ranking index without resorting to an arbitrary weighing system [6]. The technique is also very amenable (see annex) to the most recent database available, that provided by the Arab Monetary Fund. This organization, representing the Arab countries of North Africa and Western Asia, recently compiled and refined the national income statistics of its member countries. Because of its larger sample size, this database now allows for more precise estimates of output and structural change over time than was possible from individual country data compiled by standard sources such as the International Monetary Fund [7].

Factor analysis created an index representing each of the four main areas of sectoral output: manufacturing, distribution, services and construction. Each sectoral index contains two measures of output: share of non-oil gross domestic product; and absorption (total consumption and investment expenditures). Analysis focused on three years: 1974, at the beginning of the oil boom; 1981, at the end of the oil boom; and 1985, the last year for which the Arab Monetary Fund [8] provides data. The data set covers the 20 member countries of the Arab Monetary Fund in 1985: Algeria, Bahrain, Democratic Yemen, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libyan Arab Jamahiriya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates and Yemen.

The factor analysis included all 20 countries. However, to save space, tables 1, 2 and 3 below include only the results for Qatar and (as a frame of reference) the other oil producers in the region: Bahrain, Kuwait, Libyan Arab Jamahiriya, Oman, Saudi Arabia and United Arab Emirates.

The factor analysis identified four main sectors: manufacturing, construction, distribution and services. These are the "sectoral dimensions" presented in part (a) of the tables. The sectoral shares of non-oil gross domestic product and absorption (defined as consumption and investment expenditures) each represent one of the four main sectors.

Table 1. Qatar and the oil producers: factors affecting relative industrial performance - linkage and shift effects, 1975

Country	*Factor 1: manufacturing*	*Factor 2: construction*	*Factor 3: distribution*	*Factor 4: services*
	(a) Sectoral dimension (factor scores)			
Qatar	0.27	1.82	1.84	0.13
United Arab Emirates	-1.15	2.00	1.88	-0.90
Bahrain	2.74	0.35	0.91	-0.01
Saudi Arabia	0.90	1.06	-1.00	0.65
Oman	-1.53	1.10	-0.21	0.59
Kuwait	0.05	-0.83	-0.50	2.08
Libyan Arab Jamahiriya	-0.73	-0.98	-0.60	1.35
	(b) Impact of oil (factor scores)			
Qatar	0.18(=)	1.79(=)	1.90(=)	0.14(+)
United Arab Emirates	-1.23(=)	1.66(-)	1.90(=)	-1.00(=)
Bahrain	2.69(=)	-0.38(=)	0.92(=)	0.06(=)
Saudi Arabia	0.98(=)	1.81(+)	-1.09(=)	0.70(=)
Oman	-1.56(=)	1.03(=)	-0.20(=)	0.50(=)
Kuwait	0.21(+)	0.24(+)	-0.90(-)	2.22(=)
Libyan Arab Jamahiriya	-0.83(=)	0.57(-)	-0.40(+)	1.20(-)
	(c) Impact of domestic linkages (factor scores)			
Qatar	0.43(+)	1.86(=)	1.64(-)	0.71(+)
United Arab Emirates	-1.33(-)	1.83(-)	1.99(+)	0.14(+)
Bahrain	2.51(-)	-0.31(=)	0.85(=)	0.94(+)
Saudi Arabia	0.97(=)	1.22(+)	-0.99(=)	-0.50(-)
Oman	-1.32(+)	1.14(=)	-0.04(+)	-1.49(-)
Kuwait	0.60(+)	-0.25(+)	-0.43(=)	-2.29(-)
Libyan Arab Jamahiriya	-0.32(+)	0.98(=)	-0.58(=)	0.98(-)
	(d) Impact of Dutch-disease effects (factor scores)			
Qatar	0.19(-)	1.73(=)	1.25(-)	0.18(=)
United Arab Emirates	-1.01(-)	2.25(+)	1.30(-)	-0.01(-)
Bahrain	2.73(-)	0.02(+)	0.65(-)	-0.17(-)
Saudi Arabia	1.04(+)	1.70(+)	-1.42(-)	0.36(-)
Oman	-1.71(-)	0.48(-)	0.41(+)	0.89(+)
Kuwait	0.07(+)	0.90(=)	-0.04(+)	1.93(-)
Libyan Arab Jamahiriya	-0.96(-)	0.34(-)	0.07(+)	1.64(+)

Note: See annex for a description of the factor model and its use in generating factor scores. Figures in parentheses depict the direction of movement in ranking relative to sector dimension factor scores associated with each structural phenomenon: the impact of oil revenues; the impact of domestic linkage; and the impact of Dutch-disease factors. The signs (+ and -) depict the direction of sectoral movement associated with each impact. For brevity, only the oil country results are reported here.

Table 2. Qatar and the oil producers: factors affecting relative industrial performance - linkage and shift effects, 1981

Country	*Factor 1: manufacturing*	*Factor 2: construction*	*Factor 3: distribution*	*Factor 4: services*
	(a) Sectoral dimension (factor scores)			
Qatar	0.50	0.37	0.89	1.64
United Arab Emirates	0.59	1.22	1.26	-0.58
Bahrain	2.32	-0.31	2.26	0.72
Saudi Arabia	0.24	2.07	-0.97	0.21
Oman	-1.67	0.24	1.34	0.36
Kuwait	-0.02	-0.33	0.56	1.36
Libyan Arab Jamahiriya	-0.22	1.54	-0.88	0.54
	(b) Impact of oil (factor scores)			
Qatar	0.12(-)	0.92(+)	1.26(+)	1.99(+)
United Arab Emirates	0.45(-)	1.32(+)	1.30(=)	-0.29(+)
Bahrain	2.33(=)	-0.38(=)	1.97(-)	0.51(-)
Saudi Arabia	0.06(-)	2.17(+)	-0.66(+)	0.46(+)
Oman	-1.85(-)	0.57(+)	1.45(+)	0.64(+)
Kuwait	0.31(-)	0.17(+)	0.87(+)	1.64(+)
Libyan Arab Jamahiriya	-1.11(+)	1.28(-)	-0.91(=)	0.33(-)
	(c) Impact of domestic linkages (factor scores)			
Qatar	0.44(=)	0.47(+)	1.05(+)	1.69(+)
United Arab Emirates	0.47(+)	1.24(=)	1.19(=)	-0.43(-)
Bahrain	2.41(=)	-0.54(-)	2.22(=)	0.55(-)
Saudi Arabia	0.15(+)	1.98(=)	-0.85(=)	0.29(=)
Oman	-1.75(+)	0.54(+)	1.32(=)	0.58(+)
Kuwait	-0.26(+)	0.11(+)	0.65(=)	1.65(+)
Libyan Arab Jamahiriya	-1.21(-)	1.47(=)	-0.84(=)	0.55(=)
	(d) Impact of Dutch-disease effects (factor scores)			
Qatar	0.22(-)	0.24(-)	0.85(=)	1.52(-)
United Arab Emirates	0.87(+)	1.18(=)	1.15(+)	-0.42(+)
Bahrain	1.78(-)	-0.44(-)	2.34(=)	0.49(-)
Saudi Arabia	-0.12(-)	1.85(-)	-0.96(=)	0.03(-)
Oman	-1.37(+)*	0.45(+)	1.26(=)	0.46(+)
Kuwait	-0.44(-)	-0.23(+)	0.49(=)	1.52(+)
Libyan Arab Jamahiriya	-1.00(+)	1.62(=)	-0.86(=)	0.56(=)

Note: See note to table 1.

Table 3. Qatar and the oil producers: factors affecting relative industrial performance - linkage and shift effects, 1985

Country	*Factor 1: manufacturing*	*Factor 2: construction*	*Factor 3: distribution*	*Factor 4: services*
	(a) Sectoral dimension (factor scores)			
Qatar	0.79	0.29	0.16	2.75
United Arab Emirates	1.37	1.23	1.34	-0.02
Bahrain	0.86	0.40	1.96	0.59
Saudi Arabia	-0.16	1.60	-0.78	0.57
Oman	-1.53	0.39	1.11	0.23
Kuwait	-0.42	-0.87	-0.22	1.00
Libyan Arab Jamahiriya	-0.94	1.53	-0.83	1.04
	(b) Impact of oil (factor scores)			
Qatar	1.03(+)	0.20(=)	-0.09(-)	2.36(-)
United Arab Emirates	0.88(-)	1.39(+)	1.63(+)	0.77(+)
Bahrain	1.02(+)	0.30(=)	1.63(+)	0.12(-)
Saudi Arabia	-0.15(=)	1.53(=)	-0.75(=)	0.59(=)
Oman	-1.72(-)	0.50(+)	1.37(+)	1.01(+)
Kuwait	-0.62(-)	0.84(=)	-0.01(+)	1.49(+)
Libyan Arab Jamahiriya	-0.77(+)	1.47(=)	-0.85(=)	0.98(=)
	(c) Impact of domestic linkages (factor scores)			
Qatar	0.51(-)	0.33(=)	-0.12(-)	2.51(-)
United Arab Emirates	1.35(=)	1.33(+)	1.54(+)	0.34(+)
Bahrain	0.80(=)	0.37(=)	1.70(-)	0.37(-)
Saudi Arabia	0.02(+)	1.53(=)	-0.57(+)	0.67(+)
Oman	-1.52(=)	0.48(+)	1.44(+)	0.61(+)
Kuwait	-0.14(+)	-0.82(+)	0.24(+)	1.33(+)
Libyan Arab Jamahiriya	-1.04(-)	1.51(=)	-0.80(=)	1.05(=)
	(d) Impact of Dutch-disease effects (factor scores)			
Qatar	0.87(=)	0.48(+)	0.06(-)	2.91(+)
United Arab Emirates	1.25(-)	1.23(=)	1.24(-)	0.02(=)
Bahrain	0.88(=)	0.44(=)	1.89(=)	0.62(=)
Saudi Arabia	-0.35(-)	1.56(=)	-0.85(=)	0.54(=)
Oman	-1.58(=)	0.30(=)	1.14(=)	0.14(-)
Kuwait	-0.70(-)	-0.97(-)	-0.26(=)	0.84(-)
Libyan Arab Jamahiriya	-0.88(=)	1.48(=)	-0.75(=)	1.02(=)

Note: See note to table 1.

The resulting factor scores for each sector (again the sectoral dimension part of tables 1, 2 and 3) therefore represent the relative ranking (in terms of the development of each sector) of each of the 20 Arab countries. As noted above, for brevity the presentation includes only the factor scores of Qatar and the other regional oil producers.

In analysing the factor scores it is noteworthy that they have a mean of zero. In other words, the country with the highest positive factor score for a particular sector possesses the largest share (relative to the other 19 sample countries) of that sector in its economy. Similarly, the country with the lowest (negative) factor score has the smallest share of that sector in its economy. The remainder of the countries lie in between.

An interesting extension of factor analysis involves the determination of the relative extent to which developments in the rest of an economy affect (positive or negatively) national industrial diversification. Caves [9] notes the mechanism by which exports could act as an "engine of growth" (or leading sector). In the classic situation of staples, exports contribute to economic growth directly (through direct contributions to GDP), and indirectly through the medium of spread (or carry-over) effects.

As Metwally and Tamaschke [10] show, this indirect contribution to growth embraces Hirschman-type linkages. It is also a sequence of multiplier-accelerator mechanisms, by which increases in non-oil GDP augment demand for sectoral outputs (manufacturing, services and distribution). Theoretically, indirect contributions (or spread effects) can continue to accrue long after some export stimulus has occurred. The impact of an export stimulus on the economy has many determinants, such as technology and the propensity to import.

Obviously, neither the timing pattern exhibited by, nor the relative sizes of, direct and indirect contributions of exports to growth need to be fixed. They could conceivably vary between subperiods, especially over long periods of economic development. If the country exploits the investment opportunities generated by the growth of the export sector, the model predicts that economic growth will be a process of diversification about an export base.

For policy purposes, it is of some interest to identify the factors responsible for these movements. Were improvements in industrial diversification largely the response to spread effects - increases in industrial demand created by an expanding non-oil sector of the economy? These first two effects are straightforward; Mikesell [11] documents them in several case studies of primary product exporters.

A third effect is the one related to oil-financed government expenditures, the so-called "Dutch disease" effect [12]. This phenomenon stems from the overvaluation of the domestic exchange rate following an oil revenue boom. Here, the increase in domestic inflation, arising from stepped-up governmental expenditures, concentrates in those sectors of the economy that do not face foreign competition.

Because of the presence of foreign substitutes for most manufactured goods produced in Qatar, economic theory would predict a lower relative rate of price increase in the country's industrial sectors. Similarly, the resulting fall in the relative profitability of manufacturing (cheaper imports and price-cost squeeze) may cause a shift in resources to activities and products not traded in international markets.

In Qatar, the resulting suppression of the industrial sector should depend in large part on the composition of industry, that is, the relative amounts of internationally traded and non-traded goods produced, and the extent to which tariffs protect domestic producers of traded goods from foreign competition. *Cetaris paribus*, the effect would be expected to occur in Qatar because of the dominance of the oil sector, and because the country is largely open to world market forces and foreign competition. In addition, the Dutch disease effect occurs in two neighbouring countries, Kuwait ([13] and [14]) and Saudi Arabia ([12], [15] and [16]).

More specifically, it appears that, at least for Saudi Arabia and Kuwait, oil revenues work somewhat at cross purposes. On the expenditure side, oil revenues provide both effective demand and available credit, factors that would not otherwise be present. On the other hand, the competitive effects associated with exchange appreciation offset any cost-reducing effects arising from lower-cost imports of capital, intermediate goods and labour. Clearly Governments burdened with an overvalued real exchange rate will find it increasingly difficult to attain diversification through expansion of the traded goods sector.

E. Operational procedures

The following methodology (see annex) was used to measure the relative extent of the above-mentioned effects in Qatar:

(a) The factor analysis employed, on a case-by-case basis, proxies for each of the three linkage effects. As noted earlier, three dates were relevant here: 1975 - incorporating the initial effects of the oil price shocks; 1981 - the end of the oil boom; and 1985 - the last year for which comparable data were available;

(b) The first sets of factor analysis for each year were the sectoral dimension scores noted above. Each sectoral variable occurred twice, its share of non-oil GDP and as its share of absorption (consumption plus investment expenditures);

(c) In the second set of four factor exercises, the sectoral linkage effects associated with the development of the oil sector were examined. Here the oil sector appears as a share of non-oil GDP and a share of absorption. The impact of the oil sector was measured by its correlation

coefficients in each of the four sectors (for brevity, the tables present only the resulting factor scores);

(d) Generalized linkage effects arose in the third set of factor exercises, with sector correlations for non-oil GDP measuring these linkages. Non-oil GDP occurred in the analysis as a share of absorption and total GDP. As with oil, the extent of these linkage effects depended on the correlation of non-oil GDP variables with each of the four sectors;

(e) Finally, the Dutch disease, or sectoral shift factors, were introduced with the four sectoral variables. The shift factors are reflected in the change in inflation (from 1974 to the year examined) and in the appreciation of the real exchange rate (again from 1974 to the year examined). The assumption made is that inflationary periods will increase the profitability of non-tradables and reduce that of tradables, with manufacturing considered an internationally tradable product. The same was true for appreciation of the real exchange rate. As with the previous two linkage effects, shift effects were measured by the correlation of non-oil GDP variables with each of the four factors;

(f) The factor scores were computed for each of the oil-producing countries (the Libyan Arab Jamahiriya was added for the basis of comparison) in each of the four exercises. The changes in factor scores (indicated in parentheses in tables 1, 2 and 3) depict linkage and shift effects associated with each of the three effects under examination. Specifically, each of the structural variables - oil domestic linkages and the Dutch disease - will load primarily on one or more of the sectoral dimensions (factors). A country with a high degree of attainment or development of that structural variable will have a proportionately large change in its factor score. Using these changes (relative to the base or sectoral dimension), it is possible to assess the differential impact by country and sector (especially manufacturing) produced by each structural condition.

F. Results

Based on the change in factor scores (tables 1, 2 and 3) associated with each structural condition, several interesting patterns have developed over time. Initially, 1975 (see table 1) saw the following developments:

(a) The oil sector had not had time to make much of an impact on Qatar and the other six oil producers in the region. As anticipated, this impact was generally positive. The negative effects (as evidenced by the relative decline in factor scores from the base sectoral dimension with the inclusion of oil) for the United Arab Emirates and the Libyan Arab Jamahiriya were most likely the result of the simple fact that these countries began their construction boom shortly after the others and, as

a result, had a relative - but not absolute - decline in construction activity;

(b) At the beginning of the period under consideration (table 1), and before its heavy industries existed, the manufacturing sector appeared integrated with the non-oil sectors of the economy. This linkage was positive in the sense of demand linkages with non-oil GDP; factor scores (over the sectoral dimension) increased for Qatar with the inclusion of domestic linkages. At the same time, manufacturing in Qatar suffered through the negative effects associated with the Dutch disease (as reflected in the decline in factor scores from 0.27 to 0.19). In essence, Dutch disease effects were reducing the manufacturing output of Qatar below that anticipated from the benchmark (sectoral dimension) results.

By the end of the oil boom (1981), the situation was as follows:

(a) In Qatar, as well as most of the other oil countries, the oil sector continued to dominate resource allocation. Most likely, this reflected the fact that direct government expenditure of oil revenues had gone to expand government services and construction. The expansion of these sectors, with distributional activities, drew resources that might otherwise have gone to industrial activities;

(b) In terms of the creation of domestic linkages, Qatar was still not experiencing any positive effects, in contrast to the United Arab Emirates, Saudi Arabia, Oman and Kuwait. Each of these countries saw their industrial activities increase as a result of the growth of their non-oil economies;

(c) The manufacturing sector in Qatar was still feeling some effects of the Dutch disease. This apparently resulted in a shift of resources to other activities. These shifts were not nearly as great as those experienced by Saudi Arabia and Kuwait.

Finally, by 1985 the following conditions had emerged:

(a) Manufacturing in Qatar was experiencing some positive linkages with the oil sector, which were still offset by negative linkages with the non-oil sector of the economy. In this regard, the Libyan Arab Jamahiriya was the only other country experiencing similar effects;

(b) Perhaps because of relatively prudent monetary and fiscal policies, industrial output in Qatar was no longer affected by Dutch disease effects. Again, this was in sharp contrast to the situations in Kuwait and Saudi Arabia.

The findings presented above are consistent with earlier ([17]-[23]) studies of developments in oil-based economies, whose experiences have

generally differed from those of the staple-based economies. It appears that in oil economies such as that of Qatar, the general absence (until recently) of significant spread effects has made the industrialization process much less predictable than in countries experiencing classic patterns of stable development ([15], and [24] and [25]). In this regard, the large role played by the Government of Qatar has resulted in the predominance of discretionary elements over market prices as the chief factor responsible for the allocation of resources. A similar set of public policies has created a comparable situation in Saudi Arabia ([12], [16], [26-29]) and Kuwait ([13] and [14]).

In theory, Qatar should be a major beneficiary from the establishment of the Gulf Cooperation Council. In fact, a major factor behind the establishment of the Council in 1981 was the desire to create a regional marketplace to relieve the almost total dependence on oil revenues and the massive cost of imports to meet the needs of the fast-growing population, whether native or immigrant, in the Persian Gulf region. Unfortunately, the import statistics of Qatar [1] show that, in the first five years of the Council's existence, little changed. The following points are noteworthy:

(a) Slightly over 50 per cent of the imports of Qatar still came from Japan, United Kingdom, Germany, Federal Republic of and United Arab Emirates;

(b) Imports from the neighbouring Arab States in the Persian Gulf region amounted to only 5 per cent of the country's foreign supplies;

(c) More than QR 2,000 million of a total import bill of QR 3,046 million went to machinery, transport and semi-manufactured and manufactured goods.

With the uncertainty surrounding the Iraqi invasion of Kuwait (August 1990) reducing private foreign investment in the region, the era of the rapid transformation and growth of Qatar's manufacturing industry seems to be over or at least in decline. The heavy industries are now in place and must, more than ever, prove their worth. The current economic uncertainties together with the proliferation of competing light industries throughout the Persian Gulf region can only reduce, unfortunately, the incentives for private-sector industrial investment in Qatar.

G. Conclusions

The arrival of a viable and self-sufficient manufacturing industrial structure has long been the prime objective of the Government of Qatar. Industry appears as the key to successful economic diversification and as the main assurance of continued self-sustaining economic growth. Since

the large increases in oil revenues in the 1970s, the Government has directed a substantial portion of its huge development outlays towards the creation of an adequate industrial infrastructure and the establishment of certain major State and joint public-private heavy industries.

It is clear from the patterns described above, however, that industrial diversification has proceeded at rates lower than anticipated, and that this has stemmed from the lack of internal stimuli. This is particularly true for other sectors of the economy. Consequently, the process of industrialization has depended more on external rather than on internal dynamics.

As al-Niajil [30] notes, for the countries of the Persian Gulf region as a whole, industrialization has been an external rather than an internal process, thus resulting in a false understanding of the true meaning of industrialization. The theory of industrialization in its broadest sense has been confused with the practical process of installing industrial plant through turnkey contracts with foreign construction and engineering companies. Factories set up in Persian Gulf countries on this turnkey basis belong to the region in a geographical sense, but the existence and continued functioning of the factories is dependent on external factors. In other words, the process of industrialization in the Persian Gulf region has tended to be a geographical rather than a historical phenomenon. These effects appear to be magnified in Qatar.

Annex

METHODOLOGY

The main statistical tool used in the analysis above was factor analysis, and in particular oblique rotation factor analysis.* As used here, this technique was appropriate because it made it possible to: examine the correlations of a large number of variables by clustering the variables into factors such that variables within each factor are highly correlated; interpret each factor according to the variables belonging to it; and summarize many variables by a few factors. This factor analysis model expresses each variable as a function of factors common to several variables and a factor unique to the variable:

$$z_j = a_{j1}F_1 + a_{j2}F_2 + \ldots a_{jm}F_m + U_j$$

where

*In addition to Rummel [6], see James W. Frane and Mary Ann Hill, *Annotated Computer Output for Factor Analysis: a Supplement to the Writeup for Computer Programme BMDP4M*, Technical Report No. 8 (Los Angeles, MBDP Statistical Software, 1987).

z_j = the "jth" standardized variable
m = the number of factors common to all the variables
U_j = the factor unique to variable a_j
a_{ji} = factor loadings

The number of factors, m, as well as the contributions of the unique factors, should be small. The individual factor loadings a_{ji} for each variable should be either very large or very small, so that each variable is associated with a minimal number of factors.

Variables with high loadings on a factor tend to be highly correlated with each other, and variables that do not have the same loading patterns tend to be less highly correlated. Each factor is interpreted according to the magnitudes of the loadings associated with it. The original variables can be replaced by the factors with little loss of information.

Each case receives a score for each factor; these factor scores are computed as:

$$F^*_i = b_{i1}z_1 + b_{i2}z_2 + \ldots + b_{ip}z_p$$

where b_{ij} are the factor score coefficients.

Factor scores can be used in later analysis, replacing the original variables. These scores usually have less error, and are therefore more reliable measures, than the original variables. The scores express the degree to which each case possesses the quality of property that the factor describes. The factor scores have a mean and standard deviation of 1. As an example, in 1975 (see table 1) Qatar and the United Arab Emirates had by far the highest shares of output devoted to construction. At this time, construction accounted for a relatively low proportion of the production of Kuwait.

In summary, there are four main steps in factor analysis. First, the correlation or covariance matrix is computed. Second, the factor loadings are estimated (the initial factor extraction). Third, the factors are rotated to obtain a simple interpretation (making the loadings for each factor either large or small, not in between). Finally, factor scores are computed.

A key aspect of factor analysis is the concept of rotation. Factors are rotated to obtain a simple interpretation; in other words, the goal is to make the loadings for each factor either large or small, not intermediate. The common rotations are orthogonal and oblique. In orthogonal rotations, the factors are uncorrelated. In oblique rotation the scores can be correlated. However, the advantage of this rotation is that there is a greater tendency for each variable to be associated with the single factor. That is, in oblique rotations factors are formed that maximize the loadings of their component variables.

Computations were made using the BDDP Statistical package (1990). The data set used for the analysis was drawn from Arab Monetary Fund sources. It consisted of the national income accounts and sectoral output shares of member countries of the Arab Monetary Fund.

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